ROCKY FLATS PLANT, HEALTH PHYSICS LABORATORY
(Building 123)
On Central Ave. between Third and Fourth Sts.
Golden vicinity
Jefferson County
Colorado

HAER No. CO-83-B

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
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HISTORIC AMERICAN ENGINEERING RECORD

ROCKY FLATS PLANT,
ANALYTICAL HEALTH PHYSICS
LABORATORY
(Rocky Flats Plant, Building 123)

HAER No: CO-83-B

Location: Rocky Flats Environmental Technology Site, Highway 93, Golden, Jefferson County, Colorado. Building 123 is located on Central Avenue between Third and Fourth streets, in the western section of the industrial area of the Rocky Flats Plant (Plant).

Significance: One of the original buildings on the site, this building is a primary contributor to the Rocky Flats Plant historic district, associated with the U.S. strategy of nuclear military deterrence during the Cold War, a strategy considered of major importance in preventing Soviet nuclear attack on the U.S. Building 123 housed the analytical health physics laboratory. Major improvements and technological advancements occurred in the areas of radiation protection, safety, detection, bioassay, and dosimetry in Building 123.. The ability to detect minute quantities of plutonium, americium, and uranium were developed.

Description: Building 123 is U-shaped and made of concrete block on a poured concrete foundation. The doors are metal with upper glass panes. The recessed industrial, multi-pane, metal-sash windows are arranged in sets of four. On all but the east side of the building, the upper two panes are covered with metal. The east side of the building has numerous steam pipes protruding from it. The roof is flat with vents and utility boxes. The building is 18,980 square feet.

History: The Austin Company of Cleveland, Ohio originally constructed the building, in 1953. Additions were made in 1971, 1973, and the west wing of the building was added in 1975. Other major modifications included the addition of the laboratory hood scrubber system to reduce hazardous chemical releases to the environment and the discontinuance of the use of natural gas at the laboratory benches and as a facility utility system. The facility housed approximately twenty-eight offices, seventeen laboratory rooms, two laboratory support areas (instrument repair, diagnostic and calibration, etc.), one computer room, one utility room, separate men's and women's change/locker rooms with showers, two men's restrooms and two utility corridors.

Building 123 housed the Analytical Laboratory, the principle shops of the Health Physics Instrumentation Section, the External Dosimetry Section, and the majority of the Radiological Records Sections of the Radiological Health Branch of Radiation Protection. The Analytical Laboratory analyzed environmental (air, water, vegetation, soil), biological (urine, fecal material, nose swipes), health physics (room air), and industrial hygiene samples (beryllium and organic vapors in room air). The Health Physics Instrumentation Section repaired and calibrated radiation-detection instruments. The External Dosimetry Section processed the thermoluminescent dosimeters. The Radiological Records section handled most of the occupational radiation exposure and dose records of radiation workers.

The Analytical Laboratory's procedures involved preparing samples for analysis by purifying and concentrating the plutonium, americium, uranium, and tritium that may have been present in a sample. The original samples were various forms of liquids and solids that were administratively controlled by chain-of custody procedures. Several processes were used in the laboratory depending upon the physical state of the sample and the possible contaminant. The gamma counting process electronically measured soil and water samples from around the Plant for gamma radiation. The tritium analysis process determined tritium content in urine, stack effluent air, and water samples. The beryllium analysis process analyzed air filters for beryllium content. The gross alpha and beta counting process measured the levels of alpha and beta radiation in brass-ring-mounted paper in air filters. The dosimetry process evaluated body thermoluminescent dosimeter badges, worn by Plant personnel, for radiation exposure levels. The gas chromatography process analyzed for organic compounds. The bacterial lab analysis process analyzed water samples for fecal coliform and total coliform for the sewage treatment facility. Until the early 1980's, the Laboratory also participated in an autopsy program, in which site employees could register on the Transuranic Registry to have organs and tissues donated for scientific research (Trice).

Safety has always been a priority within the nuclear weapons complex. When the first quantity of plutonium was made back in the 1940s, half of the plutonium was turned over to Health and Safety experts to study the impacts of this new hazardous material on people.

Allowable exposure limits to personnel have existed throughout the life of the Plant, changing over time as new information and data has been learned. Major improvements and technological advancements occurred in the areas of radiation protection, safety, detection, bioassay, and dosimetry in Building 123. Typically in competition with the National Laboratories during the 1950s and 1960s, the Plant's scientists had real issues to solve. During the production years, funding for equipment and research programs seemed limitless. This allowed the labs access to state-of-the-art equipment to develop methods to do things faster, cheaper, and better. Rocky Flats was on the forefront of pioneering health and safety solutions and implementing advanced technologies.

In 1966, the dosimeter badges used at the Plant were a Type-A film badge. By 1969, all gamma dosimeters were converted to thermoluminescent dosimeters, and by 1967, all neutron badges used were thermoluminescent dosimeters. The Plant was the first nuclear weapons facility to use the thermoluminescent dosimeter badges (Fawk). Major advances were also made in the chemistry department. Detection limits for plutonium, americium, and uranium in urine samples was 0.15 disintegration per minute, today the detection limit is 0.02 disintegration per minute (Fawk).

This was due to improvements in procedures and equipment developed in the laboratory over the years. "Back in the old days, it was fun. We had no documents, methods, or data to work from. Everything was new, and there was so much we didn't know. Today, it's kind of old hat" (Trice).

Sources: Buffer, Pat, 1995, "Highlights in Rocky Flats History." Rocky Flats Repository. Golden, Colorado.

Fawk, Roger B., Health Physicist at the Plant, employed by the site contractor since 1966. Personal communication, January 1997.

Trice, Conrad, Developmental Chemist in Building 123 of the Plant, employed by the site contractor since 1974. Personal communication, January 1997.

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Historians: D. Jayne Aaron, Environmental Designer, engineering-environmental Management, Inc. (e^2M), 1997. Alexandra Cole, Architectural Historian, Science Applications International Corporation, 1997.